ANYWAVE

MARBLE SERIES
PRODUCT SPECIFICATIONS

LOW/MEDIUM POWER AIR COOLED SOLID STATE UHF/VHF TV TRANSMITTER/ TRANSLATOR

Introduction

The new Anywave ***MARBLE*** series of Air Cooled UHF/VHF TV transmitters provides the broadcaster with the latest state-of-the-art digital transmitter design and the highest level of performance available anywhere, yet in an extremely compact package. The power capability of these forced air cooled Solid State transmitters/translators range from 70W ATSC 1.0 (50W OFDM) to 10.2KW ATSC 1.0 (6.73KW OFDM) UHF, 300W ATSC 1.0 (200W OFDM) to 7.2KW ATSC 1.0 (4.75KW OFDM) VHF III, and 25W ATSC 1.0 (20W OFDM) to 4.5KW ATSC 1.0 (3KW OFDM) VHF I (power level before filter). They operate across all TV standards including DVB-T, DVB-T2, ATSC, ATSC3.0, ISDB-T, DTMB, NTSC, and PAL. The ***MARBLE*** series incorporates the powerful correction capabilities of the Anywave exciter platforms. In addition, the products offer many unique features not available anywhere else in the industry.

Key Facts

- ✓ Multi-standard capability: DVB-T, DVB-T2, ATSC, ATSC3.0, ISDB-T, DTMB, NTSC, and PAL
- ✓ Broadband – covers UHF from channel 14-50, VHF band I and band III also available
- ✓ Modular for better reliability and ease of maintenance
- ✓ Latest Power Amplifier LDMOS Technology – implements asymmetrical Doherty design (UHF and VHF III) for exceptional efficiency, ruggedness, and cool operation
- ✓ Industry-leading adaptive linear and non-linear correction – Anywave's own exciter
- ✓ Simple and Efficient Front-to-Back Air Cooling
- ✓ LCD Touch Screen Control System
- ✓ Remote monitoring and control via Web Browser and SNMP

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FEATURES

- ✓ ATSC Transmitter or an RF Translator (ATSC 1.0 only, some modulators include an RF input (others as an option) with a built-in receiver/demodulator)
- ✓ Full Band UHF or VHF Operation
- ✓ Powerful Adaptive Digital Pre-Correction (ADPC™). Anywave exciters are used by leading RF power transistor manufacturers to specify their device performance with superior results to other well-known brands (ask us for details)
- ✓ Real-time measurement and display of Receive Signal Strength (RSSI) and Received Signal to Noise Ratio (RSNR) in an RF Translator operation
- ✓ Real-time measurement and display of the Transmit Signal Shoulder levels (IMD), the Transmitted Signal to Noise Ratio (TSNR) and the Transmitted Power Percentage (FWD %)
- ✓ Supports ATSC 1.0 and easily upgraded to ATSC 3.0

<u>Options</u>

- ✓ Performance and Quality Measurement (PQM) Graphical User Interface (ATSC 1.0 only)
- ✓ Transport Stream over IP (TSoIP) input
- ✓ TSID/PSIP editor (ATSC 1.0 only)
- ✓ Static Picture Feature (ATSC 1.0 only)
- ✓ ASI Loop Thru (ATSC 1.0 only)
- ✓ Built-in GPS receiver

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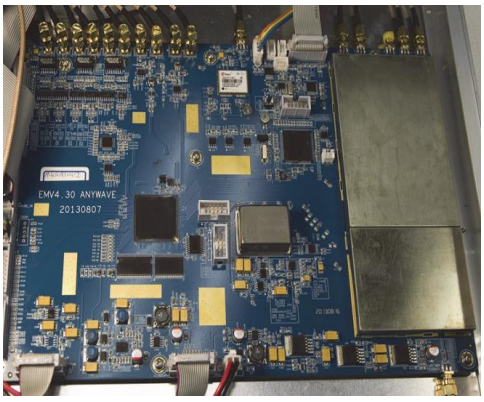
EXCITER CHASSIS & DISPLAY

The Anywave Exciter includes a back lit 40 x 2 LCD display. Multiple menus allow the real time measurements of transmitted and received frequency, output power level and input selection. The exciter/translator also measures and displays the key transmitter parameters of Intermodulation Distortion (IMD) often known as “shoulders” and the Signal to Noise Ratio (SNR) of the final transmitted signal output.

The main menu also includes a built-in power meter reading of the transmitter output power in percentage that can be easily calibrated from the front panel. The exciter also has an overheat alarm with its own temperature display, GPS information that includes the receivable satellites, clock accuracy and time.



The exciter obtains very high reliability due to the integrated design; a single board containing both analog and digital circuits, stud type connectors for long term reliability, and no connector directly connected to chassis. The exciter includes a single rugged and shielded AC/DC power supply.

A solid chassis of just 1 RU, with a low profile all aluminum structure, solid construction, well grounded for excellent RF shielding and light weight at less than 10 LBS.

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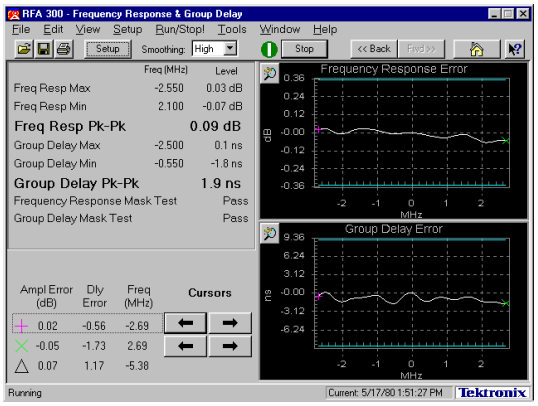
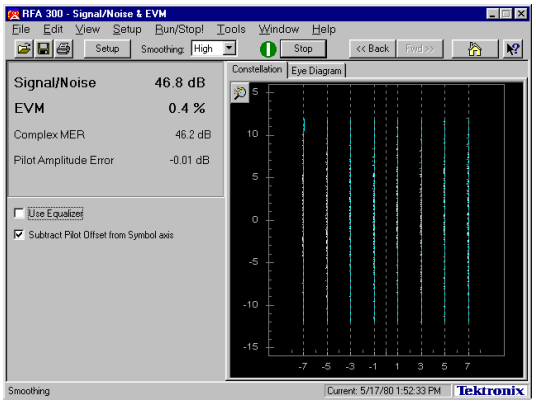
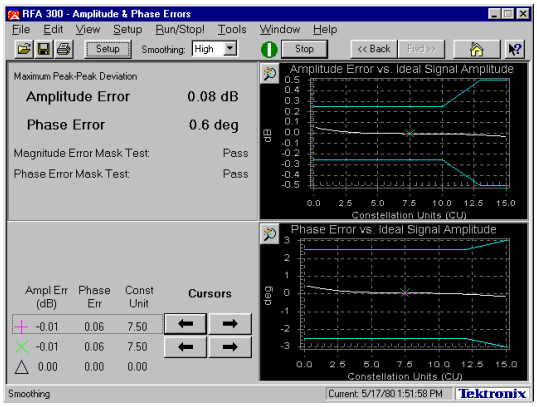
PERFORMANCE



Group Delay < 2 nS



SNR > 46dB



In-band flatness < ±0.08 dB
Phase Error < 0.7 degrees

Innovative DDRF™ (Direct Digital RF) broadband automatic balancing technology achieves near perfect RF performance with shoulder levels up to -55 dB and out-of-band spurious up to -60 dB, all based on an ultra low noise floor.

Powerful ADPC™ with linear and non-linear pre-correction obtaining up to 15 dB shoulder improvements, up to 10 dB MER (SNR) improvements, and an in-band flatness of <±0.5 dB.

Continuous measurement and display of SNR and IMD during correction.

Feedback Signal Strength (FSSI) detection and display with protections on too strong, too weak, and level varying feedback signals.

LDMOS transistors that are operated at their optimum bias characteristics provide the most linear output and hence reduce distortion.

Patented AIM™ (Adaptive Impedance Match) technology ensures impedance matching at RF Output, which realizes significant improvement in in-band performance.

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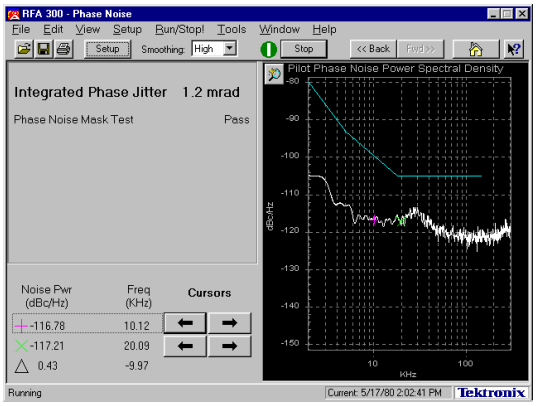
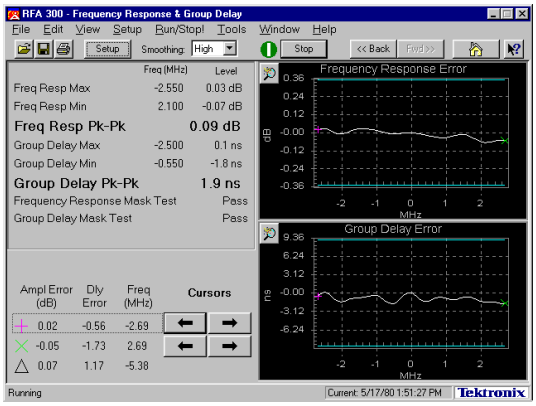
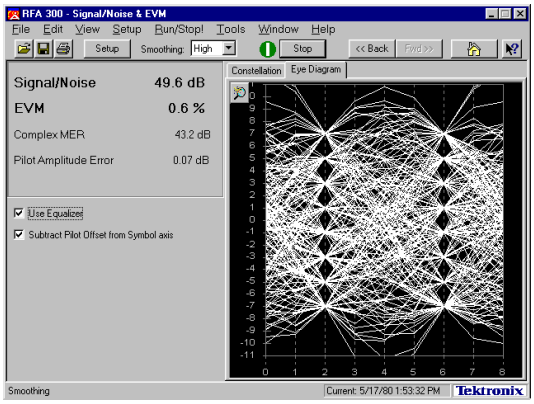
PERFORMANCE



Phase Jitter < 110 dB @ 20KHc



Frequency response flatness < 0.09dB



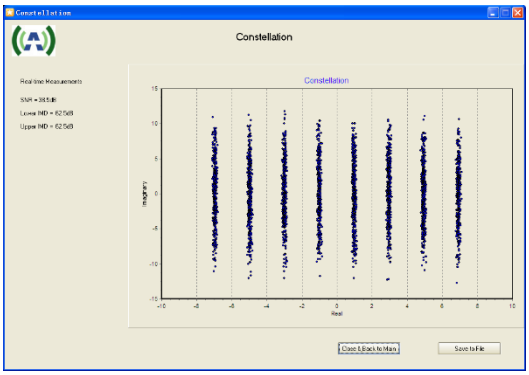
EVM < 0.7 %

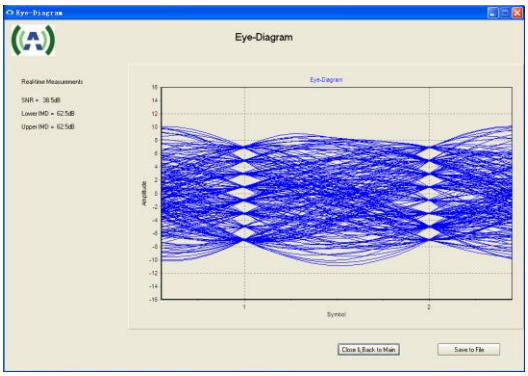
Digital ultra-wideband phase noise processing technology automatically detects, tracks and compensates phase noise to achieve superior phase noise performance.

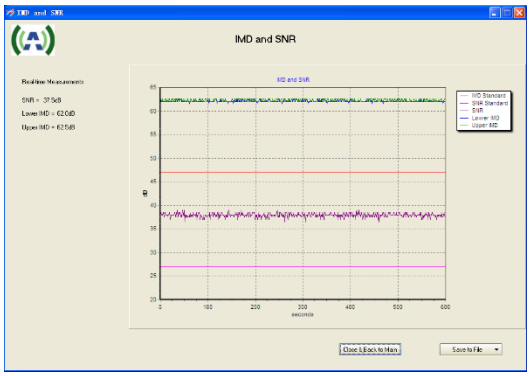
Independent feedback for adaptive SWR optimization function maximizes emission signal quality after the transmitter band-pass filters (BPF). System level AGC (Auto Gain Control) function includes both RF and DC AGC feedback obtaining a stable output power and performance.

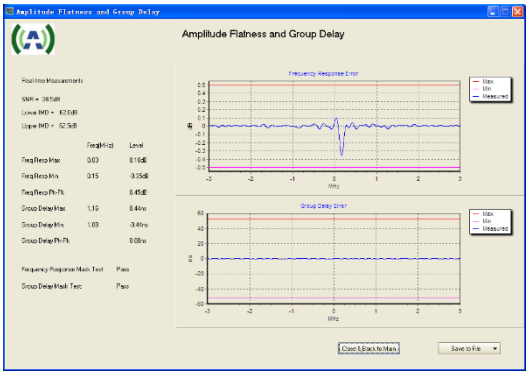
The transmitter includes a digital ultra-wideband noise processing technology that automatically detects and compensates phase noise to achieve unparalleled performance.

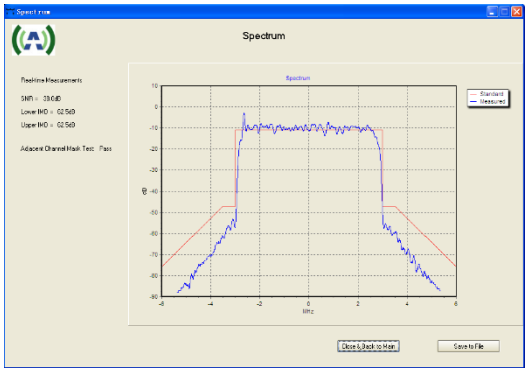
OPTION : PERFORMANCE AND QUALITY MONITORING OPTION

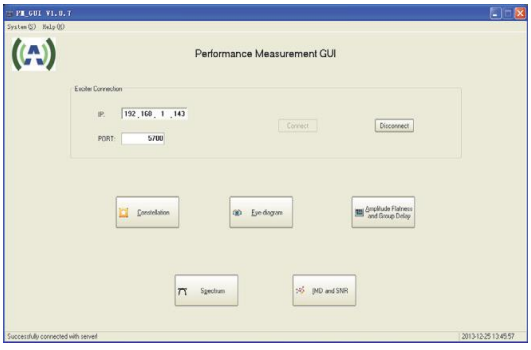








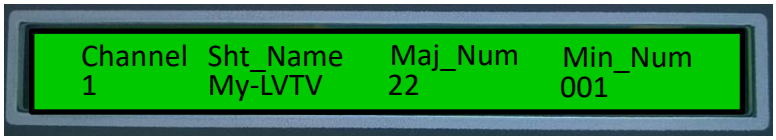


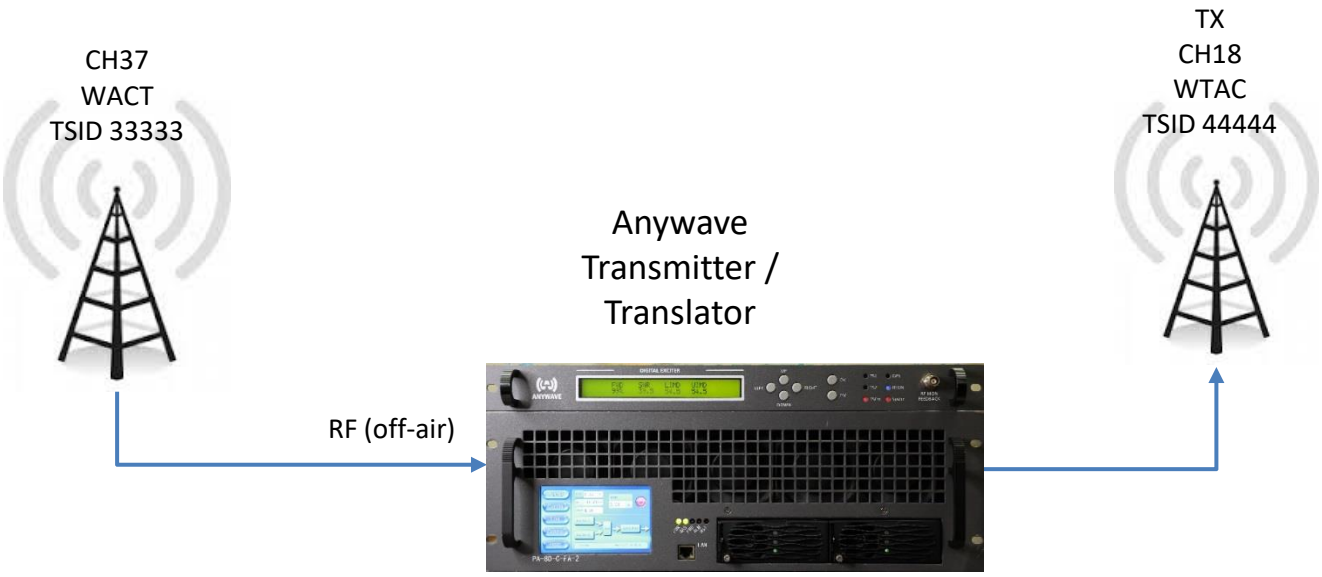


Constellation, “Eye” Diagram, Group Delay, Phase, Amplitude Frequency Response, SNR, Shoulders (IMD), Frequency Response Max/Min., Frequency Response Peak to Peak, Group Delay Max/Min. and Group Delay Mask Test (ATSC 1.0 only)

OPTION: PSIP & TSID EDIT OPTION

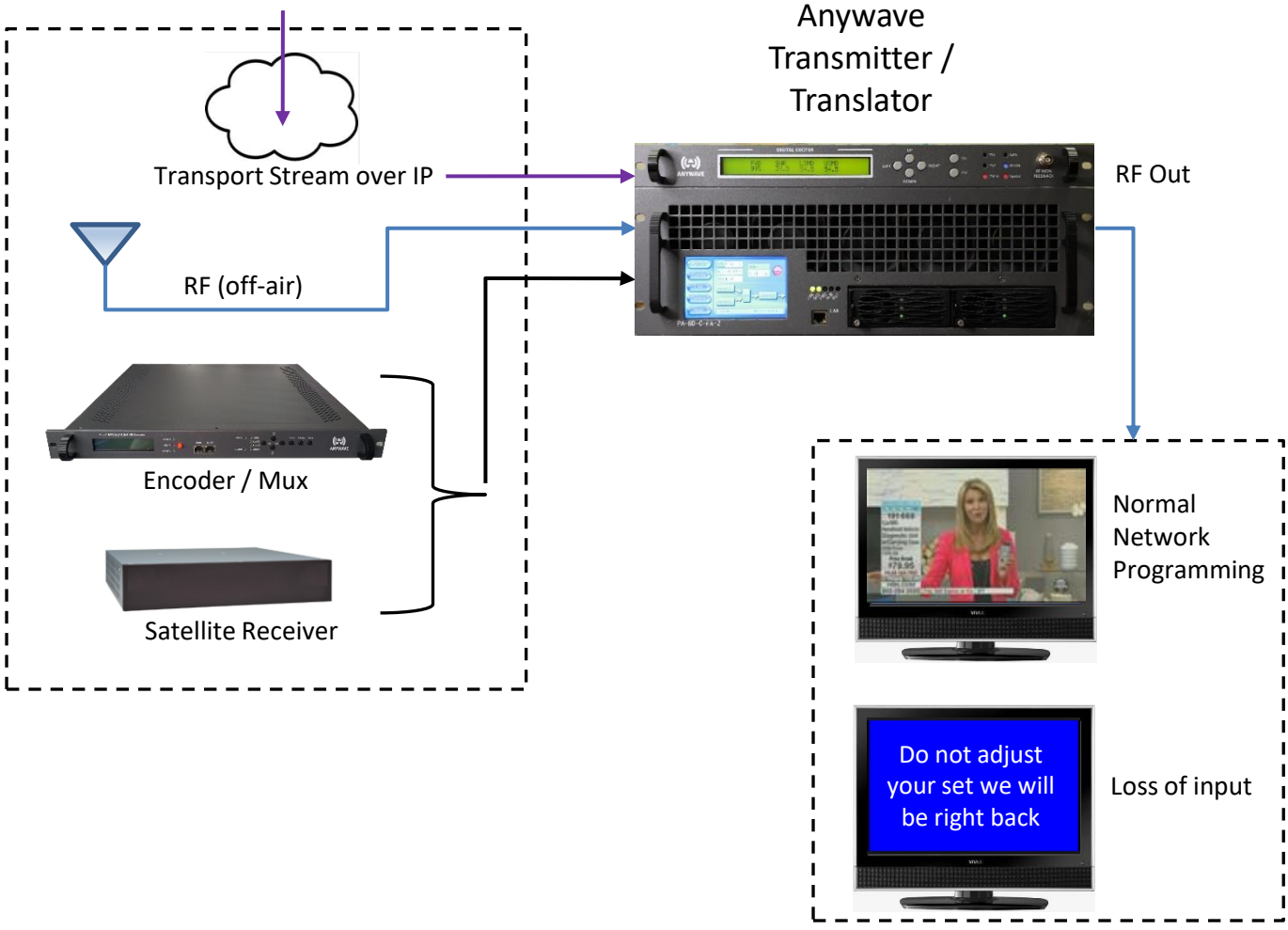
The exciter/translator has real-time detection and display of the original TSID & PSIP information. If desired, the exciter/translator can modify the contents of the PSIP table including channel number, short name, major channel and minor channel, and the TSID/BSID information of the input stream. It will pass through all Dynamic PSIP Guide information without damaging any data. The PSIP edit functions can be employed on either the ASI (exciter) or the RF Tuner (translator) inputs. (ATSC 1.0 only)





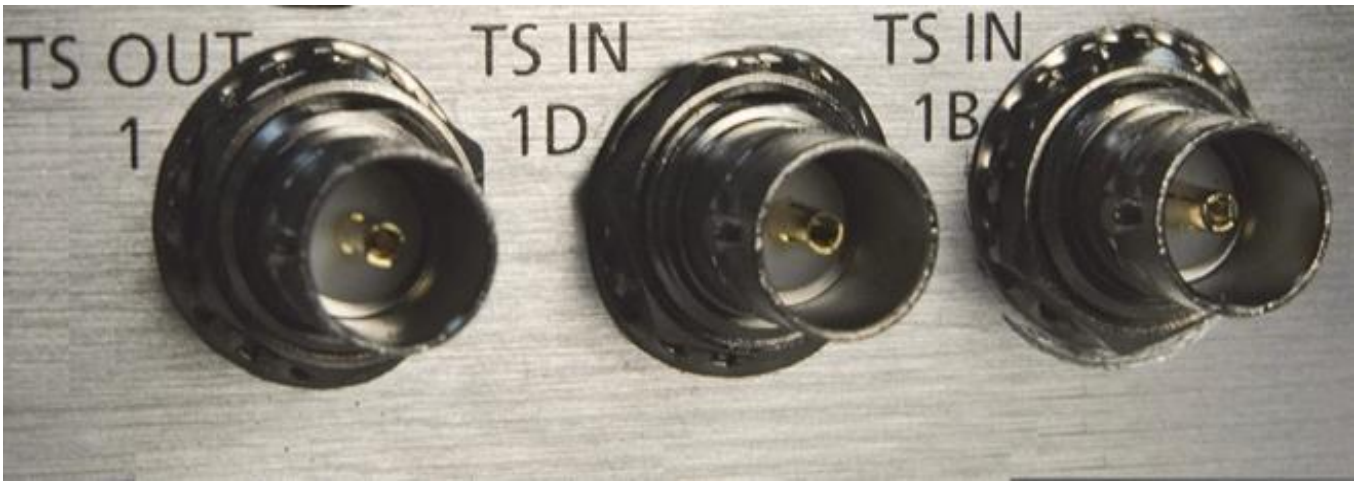
OPTION: STATIC PICTURE FEATURE (SPF)

The Static Picture is displayed on loss of ASI or RF Tuner input. Upon the failure of all inputs it will continuously loop a fully compliant Transport Stream (TS). The option provides a viewer message instead of blue screen. Without SPF, if you lose input signal, you potentially lose customers. With SPF, this means you can legally stay on the air, even without an input signal. (ATSC 1.0 only)



OPTION: ASI LOOP THROUGH

If the Anywave exciter is operated in the translator mode (RF Tuner), an RF receiver antenna is connected to the RF Input port of the exciter and the exciter can then be tuned to any VHF or UHF incoming channel. The RF Tuner demodulates the signal down to an ASI baseband output, and can be configured to be connected not just to the modulator board inside the exciter, but also can be fed to the back of the exciter to the ASI output port. This allows a TV network to monitor the incoming signal on a ASI test system or ASI transport stream reader without additional demodulators. (ATSC 1.0 only)



The Anywave exciter has an output range of -25dBm (3 µW) to +5dBm (3.16 mW). If greater output power levels are required an external power amplifier (2W module) is available.

OPTION: TSoIP

The TSoIP module inside the Anywave exciter/translator enables the Exciter to receive a transport stream through an IP network. The TSoIP module converts the IP stream to ASI and feeds the corresponding ASI stream back out the exciter rear panel TSoIP Out BNC connector.

Welcome to TS_NET interface!					
	IP	MASK	GATE	MUTI	MISC
Default	192.168.001.200	255.255.255.000	192.168.001.001	235.100.001.001	
Options	***.***.***.***	***.***.***.***	***.***.***.***	***.***.***.***	

OPTION: GPS

The Anywave exciter/translator can include a built in GPS receiver for SFN deployment. It has the option of a built in powered antenna port, with antenna presence detection. The exciter provides the GPS reception status: number of satellites, clock accuracy etc. the TOD for distribution over satellite (delay > 1 s) and a 10 MHz and 1PPS input and output to feed a multiplexer: making it unnecessary to have a stand alone GPS for a multiplexer. Its frequency and 1PPS can be held for many hours even with complete GPS disruption.

KEY EXCITER SPECIFICATIONS

Frequency: VHF/UHF in steps of 1 Hz, spectrum shifting up to ± 50 kHz

Level: -25 dBm ~ +5 dBm in steps of 0.05 dB

Level Stability: < ± 0.1 dB

Frequency Stability: < 0.5 x 10^{-7}

Symbol Rate: 10.762238 MHz (ATSC 1.0)

MER: > 40 dB

Amplitude Flatness: < 0.5 dB

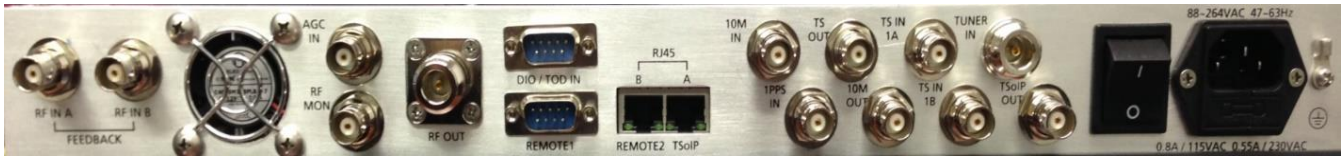
Shoulder Level: < -60 dB @ ± 500 KHz

Out of Band Spurious: < -60 dB

Pilot Amplitude Error: < ± 0.1 dB (ATSC)

Return Loss: > 15 dB

Phase Noise: < -107 dBc/Hz @ 20 kHz



Exciter Rear Panel

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Marble Series Specifications

(Power ratings before bandpass filter)

MARBLE Series - UHF [1]										
Standard	All [2]									
Number of Amplifiers	1	1	1	1	1	2	3	4	5	6
Output Power (RMS) ATSC	70	300	600	1200	2000	3400	5100	6800	8500	10200
Output Power (RMS) OFDM	50	200	400	790	1320	2240	3370	4490	5610	6730
Output Power (Peak) Analog	160	690	1380	2760	N/A	N/A	N/A	15640	19950	N/A
Output Connector	N		7-16 DIN	1 5/8" EIA				3 1/8" EIA		
Band	UHF									
Height (inches/mm)	3.5/90	5.3/133		7/178	7.88/200	61.2/1555				
Width (inches/mm)	19/480					23.62/600				
Depth (inches/mm)	12/304	18/457	21/533	24.4/619	28.3/718	47.2/1200				
Weight(LBS/Kg)	40/18	46/21	52/24	88/40	108/49	520/236	700/318	810/367	980/445	1140/518
AC input frequency	50/60 Hz									
AC input voltage	120 VAC Single ϕ		240 VAC Single ϕ			208 VAC Three ϕ				
Consumption - ATSC 1.0 - W	280	800	1550	3050	5050	8650	12900	17150	21400	25650
Current rating per ϕ - ATSC 1.0 - A	2.3	6.7	6.5	12.7	21.0	24.0	35.8	47.7	59.5	71.3
Consumption - OFDM - W	250	550	1050	2030	3350	5750	8580	11380	14180	16980
Current rating per ϕ - OFDM - A	2.1	4.6	4.4	8.5	14.0	16.0	23.9	31.6	39.4	47.2
Consumption - Analog (Peak) - W	450	1280	2480	4880	N/A	N/A	N/A	N/A	N/A	N/A
Current rating per ϕ - Analog - A	3.8	10.7	10.3	20.3	N/A	N/A	N/A	N/A	N/A	N/A

(1) Power measured before band pass filter
(2) Standards include ATSC, ATSC 3.0, DVB-T, DVB-T2, ISDB-T, CMMB, DTMB, NTSC, PAL

MARBLE Series - VHF III [1]							
Standard	All [2]						
Number of Amplifiers	1	1	1	2	3	4	6
Output Power (RMS) ATSC	300	600	1200	2400	3600	4800	7200
Output Power (RMS) OFDM	200	400	790	1580	2380	3170	4750
Output Power (Peak) Analog	690	1380	2760	5520	N/A	N/A	N/A
Output Connector	N	7-16 DIN	1 5/8" EIA				
Band	VHF Band III						
Height (inches/mm)	5.25/133	7/178	8.74/222	61.2/1555			77.6/1970
Width (inches/mm)	19/480			23.6/600			
Depth (inches/mm)	19/480		24/610	47.2/1200			
Weight(LBS/Kg)	48/22	54/25	96/44	520/236	700/318	810/367	1000/454
AC input frequency	50/60 Hz						
AC input voltage	120 VAC Single ϕ	240 VAC Single ϕ		240VAC Single ϕ or 208VAC Three ϕ		208 VAC Three ϕ	
Consumption - ATSC 1.0 - W	880	1720	3380	6820	10150	13480	20150
Current rating per ϕ - ATSC 1.0 - A [3]	7.3	7.2	14.1	28.4/19.0	42.3/28.2	37.5	56
Consumption - OFDM 1.0 - W	610	1160	2240	4540	6760	8960	13340
Current rating per ϕ - OFDM - A [3]	5.1	4.8	9.3	18.9/12.6	28.2/18.8	24.9	37.1
Consumption - Analog (Peak) - W	1410	2750	5410	10910	N/A	N/A	N/A
Current rating per ϕ - Analog - A [3]	11.8	11.5	22.5	54.3/36.2	N/A	N/A	N/A

(1) Power measured before band pass filter
(2) Standards include ATSC, ATSC 3.0, DVB-T, DVB-T2, ISDB-T, CMMB, DTMB, NTSC, and PAL
(3) 2,3 PA config - Current rating is for 240 VAC Single ϕ / 208 VAC Three ϕ

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Marble Series Specifications

(Power ratings before bandpass filter)

MARBLE Series - VHF I [1]								
Standard	All [2]							
Number of Amplifiers	1	1	1	1	2	3	4	6
Output Power (RMS) ATSC	25	190/150	380/300	750/600	1500/1200	2250/1800	3000/2400	4500/3600
Output Power (RMS) OFDM	20	130/100	250/200	500/400	990/790	1490/1190	1980/1580	2970/2380
Output Power (Peak) Analog	60	440/350	870/690	1730/1380	3450/2760	5180/4140	6900/5520	N/A
Output Connector	N		7-16 DIN	1 5/8" EIA				
Band	VHF Band I							
Height (inches/mm)	5.25/133	7/178		8.74/222	61.2/1555			77.6/1970
Width (inches/mm)	19/480				23.6/600			
Depth (inches/mm)	17/432	19/480		24/610	47.2/1200			
Weight(LBS/Kg)	30/13.6	48/22	54/25	96/44	520/236	700/318	810/367	1000/454
AC input frequency	50/60 Hz							
AC input voltage	120 VAC Single ϕ		240 VAC Single ϕ		240VAC Single ϕ or 208VAC Three ϕ		208 VAC Three ϕ	
Consumption - ATSC 1.0 - W	150	810/650	1570/1250	3050/2450	6150/4950	9150/7350	12.2K/9750	18.2K/14.6K
Current rating per ϕ - ATSC 1.0 - A [3]	1.3	6.8/5.4	6.5/5.2	12.7/10.2	25.6/20.6	38.1/30.6	33.8/27.1	50.4/40.4
Consumption - OFDM 1.0 - W	130	570/450	1050/850	2050/1650	4110/3310	6110/4910	8070/6470	12K/9.7K
Current rating per ϕ - OFDM - A[3]	1.1	4.8/3.8	4.4/3.5	8.5/6.9	17.1/13.8	25.5/20.5	22.4/18	33.4/26.9
Consumption - Analog (Peak) - W	240	1300/1040	2510/2000	4880/3920	9840/7920	14640/11760	19440/15600	N/A
Current rating per ϕ - Analog - A[3]	2	10.8/8.7	10.5/8.3	20.3/16.3	41/33	61/49	54/43.4	N/A

(1) Power levels CH2,3,4 / 5,6 --- Power measured before band pass filter
(2) Standards include ATSC, ATSC 3.0, DVB-T, DVB-T2, ISDB-T, CMMB, DTMB, NTSC, and PAL
(3) 2,3 PA config - Current rating is for 240 VAC Single ϕ

Cost Effective 100%

Reliable 100%

Scalable 100%

Dependable 100%

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